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DOI:

[10.1080/09638237.2019.1581348](https://doi.org/10.1080/09638237.2019.1581348)

*Document Version*

Peer reviewed version

[Link to publication record in King's Research Portal](#)

*Citation for published version (APA):*

Diehle, J., Williamson, V., & Greenberg, N. (2019). Out of sight out of mind: an examination of mental health problems in UK military reservists and veterans. *Journal of Mental Health*.  
<https://doi.org/10.1080/09638237.2019.1581348>

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## Abstract

**Background:** Reservists often have different experiences to regular military personnel which may impact their mental health.

**Aims:** To investigate the incidence of mental health problems in both active and veteran reservists and determine how this compares to regular service personnel and ex-regular veterans.

**Method:** Five studies which included reservist and/or veteran participants, a validated assessment of mental health problems, and provided primary data were included in the synthesis. Common mental health disorders, post-traumatic stress disorder and alcohol use disorder were examined.

**Results:** Non-deployed mobilised reservists were significantly less likely to report common mental health disorders than non-deployed regulars. There were no other significant differences between groups. Regardless deployed reservists reported more mental health problems than non-deployed reservists. Similarly, ex-regular deployed veterans were more likely to experience mental health difficulties than non-deployed ex-regular veterans. Notably, a large proportion of non-deployed reservists reported probable alcohol use disorders, indicating that problematic alcohol consumption may not be due to deployment in this group.

**Conclusion:** These results highlight the need for ongoing support for military regular, ex-regular and reservist personnel. Additional research is needed to examine potential risk and protective factors for mental health problems in both deployed and non-deployed reservists.

**Keywords:** Reservist, Veteran, Mental Health, Resilience

The UK armed forces (UK AF) is structured to ensure personnel develop a strong military identity, with internal group cohesion and powerful social bonds (Hatch et al., 2013; Wessely, 2006). As such, leaving the UK AF is a major life transition that can result in a loss of social support and difficulties renegotiating ones' identity within civilian society (Atherton, 2009; Hatch et al., 2013). The loss of social and institutional support may contribute to mental health difficulties in some service leavers (Hatch et al., 2013; Iversen et al., 2011). As approximately 22,000 regular service personnel leave the UK AF annually (Ministry of Defense, 2013) the impact of leaving the AF on personnel wellbeing and their resulting support needs represents a pressing issue.

The UK AF also employs over 36,000 reservists who do not typically experience the same group cohesion as regular personnel; instead, reservists spend most of their time in the civilian world and have a social support network largely made up of non-military connected civilians (National Audit Office, 2006). Most reserve forces were initially established to perform home defence roles but have been increasingly utilised for overseas operations. For example, in 2003, more than 8,000 reservists were deployed to Afghanistan, which is approximately twice as many as had been deployed to Bosnia in 1995 (National Audit Office, 2006). Plans for the UK Ministry of Defence (MOD) include assigning the reserve forces an even more prominent role in the defence of the realm. Between 2011 and 2020, the strength of the regular Army will decrease by about 20,000 personnel with the intention to increase the Army reserve forces by approximately 11,000 trained personnel (National Audit Office, 2014). When reservists are deployed, they may not have the social support that regular service members experience during deployment. Following deployment, the civilian-orientated medical care available to reservists may be less well equipped to manage military-related mental health difficulties and reservists' social support networks may not be prepared to mitigate the traumatic events experienced on deployment (Iversen & Greenberg, 2009). This

may potentially explain why, in comparison with regular UK AF personnel, reservists have an increased prevalence of some mental health disorders, including post-traumatic stress disorder (PTSD), following deployment (Fear et al., 2010; Hotopf et al., 2006; Thomas et al., 2010).

However, reservists are not at an increased risk of all mental health conditions and some studies have found reservists to be less likely to develop alcohol related problems and have similar vulnerability to common mental health disorders as regular military personnel (Fear et al., 2010).

Given the impact of deployment on reservist and veteran mental health as well as the MOD's plans for increased use of reserve forces, a more thorough understanding of the mental health status of reservists and veterans is needed to anticipate future mental health needs. In the past years, large cohort studies have been executed by research groups at King's Centre for Military Health Research (KCMHR) in order to get more insight in the mental and physical health of military personnel. Although these cohorts were large in number, subgroups, especially reservist veterans have been under represented. Therefore, this synthesis was undertaken to i) investigate the incidence of mental health problems in both active and veteran UK AF reservists, and ii) determine how this compares to regular UK AF service personnel and ex-regular veterans.

## **Methods**

### **Inclusion criteria**

To be included in the synthesis, studies had to be cohort studies executed at the KCMHR prior September 2015. Cohort studies from KCMHR were included as these are the largest studies of UK AF mental health conducted to date and researchers were granted access to the primary data. The studies had to include reservist and/or veteran participants, a validated assessment of mental health problems. **Studies were excluded if a subpopulation of**

a larger study was used where the larger study was already included in the analysis to prevent duplication.

Five eligible studies were included (see Table 1). The included studies included the following populations:

- a) Gulf one cohort: Study data presented in the research article by Unwin and colleagues (Unwin et al., 1999). This cohort includes mainly service personnel who had been deployed on Operation Granby in 1991/92 ( $n = 2,735$ ), or to Bosnia during 1992-97 ( $n = 2,393$ ) or service personnel who had not been deployed ( $n = 2,422$ ).
- b) King's Centre for Military Health Research (KCMHR) cohort study phase 1: Study data presented by Hotopf and colleagues (Hotopf et al., 2006). First phase of the KCMHR cohort study. This study included UK AF personnel who had served on operations in Afghanistan ( $n = 4,722$ ) and UK AF personnel who had not ( $n = 5,550$ ). For the purpose of analysis, we included those who only took part in phase 1 of the KCMHR cohort study.
- c) KCMHR cohort study phase two: Study data presented by Fear and colleagues (Fear et al., 2010). Reassessment of those who participated in phase one ( $n = 6,429$ ) and assessment of two additional groups of UK AF personnel were included to represent the military structure in 2009 (those who have joined the military since 2003;  $n = 2,665$ ) and operational deployments to Afghanistan, between April 2006, and April 2007 ( $n = 896$ ). We included only those who participated in both phase one and phase two of the KCMHR cohort study in the analysis.
- d) Screening study phase two: Study data presented by Rona and colleagues (Rona et al., 2006). This study is a follow-up study to the screening study phase one executed by Rona and colleagues in 2002 where randomly selected UK AF units were invited to complete questionnaires regarding psychological health. The data collection for phase

two took place at the same time as the KCMHR cohort study phase one. Participants were non-deployed service personnel ( $n = 1,216$ ) and personnel who had been deployed to Afghanistan ( $n=669$ ). We only included those who had participated exclusively in phase two of the screening study in the analysis.

- e) Screening study phase 3: Data is from the third phase of the screening study by Rona et al. (Rona et al., 2007) and data collection took place at the same time as the KCMHR cohort study phase two. We included only participants who participated in both phase two and phase three of the study in the analysis.

## Measures

Four studies used the same questionnaires to screen for UK AF mental health problems (Rona et al., 2006a, 2006b; Fear et al., 2010 Hotopf et al., 2006). The General Health Questionnaire (GHQ-12; Goldberg & Hillier, 1979) is a 12-item questionnaire to assess probable common mental disorders. Those scoring four or more on this measure are classified as 'cases.' The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item standardized self-report rating scale for PTSD. A case of probable PTSD is defined as a score of 50 or more. The Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a 10-item screening test for probable alcohol abuse/misuse; in most UK military studies a case is defined as 16 or more (Rona et al., 2009).

Unwin et al. (Unwin et al., 1999) used items from the Mississippi Scale for Combat related PTSD (M-PTSD; Keane et al., 1989) to assess probable PTSD. A case was defined as the experience of one symptom in each of four classifications - intrusive thoughts, avoidance, arousal and irritability - and at least two additional symptoms of unrefreshing sleep, fatigue, alcohol intolerance, forgetfulness, poor concentration, loss of sexual interest, and decrease in

appetite (Unwin et al., 1999). Alcohol use disorder (AUD) was not measured using a structured, validated instrument. Therefore, this study was not included in the meta-analyses of alcohol abuse.

### **Subgroup analyses**

For each study, participants were divided into the following eight groups:

1. Regular service personnel deployed
2. Regular service personnel non-deployed
3. Ex-regular veterans deployed
4. Ex-regular veterans non-deployed
5. Mobilised reservists deployed
6. Mobilised reservists non-deployed
7. Veteran reservists deployed
8. Veteran reservists non-deployed

In the UK military, reservists mobilise for specific duties or deployments. This would include periods of several months before a deployment for the necessary preparatory training and after a deployment to allow time for troops to receive welfare and mental health briefings, take leave and hand back military kit. Also, in the UK, the term 'veteran' applies to any service personnel, regular or reservist, who has served for one day or more.

### **Study quality**

The methodological quality of studies included in the synthesis were examined using a nine-item checklist adapted from Kmet et al. (2004). Adapted items on the checklist include an appraisal of whether: the study design was apparent and appropriate; the outcome measure(s) of mental health were well defined; method of participant selection was well explained; and the analytic methods used were described and appropriate. Studies were scored

depending on the extent to which the specific criteria were met ('yes'=2, 'partial'=1, 'no'=0) and we calculated a summary score for each study by summing the total score across all items of the scale (highest possible score = 18). All studies scored highly in terms of study quality (range= 16-17), with the leading reason for lower marks due to insufficient description of study measures.

### **Data analysis**

We used meta-analytic analyses to synthesize the results across the five studies. Analyses were conducted using R version 3.0.1. For each study, cases according to the cut-off scores for each questionnaire were calculated per group. The total number of participants and the number of cases per group were exported to R. Using the 'metaprop' command with raw numbers, twenty-four meta-analyses were conducted, one per group (8) and per outcome (common mental health disorders [n=23030], PTSD [n=23210], alcohol use [n=15288]). A random effects model was chosen *a priori* to calculate the overall effect given the diversity of the studies. Given the small number of participants across analyses, examination of potential moderator variables (e.g. participant age, gender, etc.) was not feasible. The  $I^2$  was used to assess heterogeneity. The resulting  $I^2$  were interpreted following Higgins et al.'s (Higgins, Thompson, Deeks, & Altman, 2003) guidelines: 25% as "low", 50% as "moderate" and 75% as "high" heterogeneity.

### **Results**

There was a larger number of regular service personnel participating in all studies compared to reservists (see Table 1). This difference was particularly pronounced in the earlier initiated studies where only a few reservists participated (Gulf one cohort, (Unwin et al., 1999); Screening study phase two, (Rona et al., 2006); Screening study phase three, (Rona et al., 2007)). The results of the 24 meta-analyses and corresponding confidence intervals (CI)



can be found in Table 2. In 15 of the meta-analyses, heterogeneity was found to be larger than 50% meaning a substantial amount of variation is attributable to study heterogeneity.

### **Common mental health disorders**

Overall, we found comparatively large proportions of general mental health problems across the samples (between 15% and 35%). There were no significant differences between sample groups in terms of personnel type (e.g. regular, veterans, mobilised reservists, or veteran reservists) or deployment status (e.g. deployed vs non-deployed). However, the largest proportions of general health problems were found in deployed veterans, both regular and reservists (see Table 2). For regular service personnel, deployment status did not markedly impact the proportion of mental health problems (20% in deployed vs 21% in non-deployed). Similarly, 23% of deployed mobilised reservists met criteria for mental health problems, compared to 15% of non-deployed mobilised reservists. Comparison of regulars and reservists identified that significantly fewer non-deployed mobilised reservists reported probable common mental health disorders (0.15, 95% CI 0.12, 0.18) than non-deployed regulars (0.21, 95% CI 0.20, 0.22). No other significant differences in mental health problems were found between regulars and reservists.

### **PTSD**

We found relatively small proportions of PTSD across the samples (between 2% and 9%). Overlapping confidence intervals suggest no significant differences in the proportion of PTSD between groups. Notably, the highest proportion of PTSD was found in deployed ex-regular veterans (9% deployed vs 5% non-deployed) and deployed veteran reservists (9% deployed vs 4% non-deployed). This pronounced effect of deployment was not found in regular service personnel (4% deployed vs 3% non-deployed) or mobilised reservists (4% deployed vs 2% non-deployed). Comparison of regulars and reservists found no significant differences in proportion of PTSD.

### **Alcohol use disorders**

Although not statistically significant, compared to deployed mobilised and veteran reservists, the largest proportion of AUDs was found in deployed regulars (14%) and ex-regular veterans (13%). Across all groups, the lowest proportion of AUD was found in mobilised reservists (9% deployed, 8% non-deployed). There was a slightly larger proportion of regular service personnel reporting probable AUDs than ex-regular veterans; however, overlapping confidence intervals indicate that this difference was not statistically significant. Comparisons between regulars and reservists indicate no significant differences in proportions of AUD across samples.

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Insert Tables 1 and 2 around here

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### **Discussion**

The role of reservists in the UK AF has changed over the past decade, with increasing numbers of reservists deploying to combat zones. The MOD's restructuring plans indicate that reservists are likely to play a more prominent role in the UK AF in future and reservists may be at increased risk of mental health difficulties given the differences in social and formal support available to them compared to regular personnel. UK AF ex-regular veterans may also be vulnerable to mental health problems due to a deficit in social support and the need to renegotiate one's identity on leaving the UK AF (Hatch et al., 2013). Therefore, the aim of this review was to determine what impact serving in the UK AF had on active and veteran reservist mental health and how this compares to regular and ex-regular service personnel and veterans.

Although based on a relatively small number of studies, the results of this meta-analysis indicate that a significantly smaller proportion of non-deployed mobilised reservists report general mental health disorders than non-deployed regulars. Confidence intervals for all other analyses overlapped and no other statistically significant differences between groups were found. Nonetheless, while not significant, data indicated that mobilised deployed reservists were more likely to experience mental health problems than non-deployed reservists. This was also the case for deployed regular veterans, consistent with previous research which found rates of veteran mental health diagnoses to substantially increase following deployment to Iraq and Afghanistan (Seal et al., 2009). In regular serving personnel, the difference between deployed and non-deployed personnel was less prominent. It might be that serving regulars under-report mental health problems in order to be considered fit to go on further deployment or to avoid being perceived as weak by fellow comrades (Murphy et al., 2016). This may explain why deployed regular veterans report more mental health problems than non-deployed regular veterans as, after leaving the AF, there may be no reason to deny mental health problems. Furthermore, when service personnel retire from the military, they may lose the in-group cohesion and social support experienced during active service, which could contribute to the development of mental health problems (Atherton, 2009; Hatch et al., 2013). It should also be noted that experiencing mental health problems following deployment or transition from the military can also be extremely challenging for family members (Segal & Segal, 2006; Fear et al., 2018). While some interventions to foster wellbeing in military-connected families have yielded promising findings (e.g. Families OverComing Under Stress [FOCUS] in the USA; Lester et al., 2011), additional efforts to ensure adequate support is readily accessible in the UK may be worthwhile.

Comparisons of ex-regular veterans and veteran reservists showed that differences in mental health between these groups were very small. As regular service personnel are more likely to fulfil combat roles on deployment than reservists and those serving combat roles are at greater risk of PTSD (Richardson, Frueh, & Acierno, 2010; Xue et al., 2015), it was expected that a significantly greater proportion of regulars would report PTSD compared to reservists. Such results were not found, and it is possible that the high levels of social support often experienced by regular service personnel mitigate against this elevated risk. Recent research has highlighted several risk factors for PTSD in regular service personnel and ex-regular veterans, including prior trauma exposure, younger age, female gender, low education, and length and number of deployments (Seal et al., 2009; Xue et al., 2015). However, it remains unclear at this stage whether these factors convey a significant risk for PTSD in reservists as well and additional research is needed.

Regarding UK AF probable AUD, overall, a smaller proportion of reservists reported problematic alcohol consumption compared to regular serving personnel and ex-regular veterans. This is consistent with research that found 67% of male personnel in the regular UK AF report hazardous drinking, compared to 38% of males in the general population (Sundin et al., 2014). Proportions of AUDs in regular serving personnel and ex-regular veterans in this review were almost identical, indicating that alcohol consumption does not substantially increase on leaving the AF. However, the proportion of AUDs in veteran reservists was marginally greater than the proportion in mobilised reservists, with the greatest amount of problematic drinking reported in non-deployed veteran reservists. This suggests that the problematic consumption of alcohol in this group may not be deployment-related. Alternatively, those reservists who are selected for deployment may have problematic alcohol consumption problems prior deployment. This finding is in contrast to Jacobson et al. (Jacobson et al., 2008) who found deployed US reservists to be significantly more likely to

experience new-onset alcohol related problems than non-deployed reservists. Nevertheless, as a substantial number of UK reservists report problematic alcohol consumption, additional research is needed to determine the risk factors for problematic alcohol consumption in UK AF reservists. It is possible that risk factors for AUDs in the general population, including parental alcohol problems and impulsivity (Poikolainen, 2000), may be more applicable.

### **Limitations**

This review was limited by several factors. First, our results are based on a small number of high-quality studies and some studies included in review included small numbers of reservists. However, conducting research with reservists is often challenging as reservists can be more difficult for researchers to contact than regular service personnel. Second, large amounts of heterogeneity were found in several analyses, meaning our results are tentative should be interpreted with caution. Third, with our aim being to compare different sub-groups and outcomes, we were unable to examine specific mental health conditions in detail. Instead, a global overview of the proportion of mental health conditions is presented. Finally, this study examined military populations who served in a variety of conflicts at different points in time. As armed conflicts can vary in terms of the political, social and cultural climate; the nature of combat exposure; and warfare techniques, with sub-sequent implications for psychological adjustment, we recommend these variables are considered in future studies

### **Conclusions**

In conclusion, we conducted a meta-analysis of the impact of serving in the UK AF on reservist mental health. Comparison of (ex-)regulars and reservists identified that a significantly smaller proportion of non-deployed mobilised reservists reported common mental health disorders than non-deployed regulars. Although non-significant, our results indicate that deployed reservists generally experience more mental health problems than non-

deployed reservists. This trend was also observed in ex-regular veterans, with ex-regular deployed veterans being more likely to experience mental health difficulties than non-deployed ex-regular veterans. However, a greater proportion of non-deployed reservists reported probable AUDs, indicating that problematic alcohol consumption may not be due to deployment in this sample. Our findings highlight the need for additional research examining potential risk and protective factors for mental health problems in both deployed and non-deployed reservists.

**Key points:**

- Overall, mobilised deployed reservists were more likely to experience mental health problems than non-deployed reservists. Non-deployed regulars reported significantly more common mental health problems than non-deployed mobilised reservists.
- Reservists and (ex-)regulars reported similar rates of PTSD. This suggests reservists are vulnerable to developing PTSD following non-combat related trauma that may not lead to PTSD in regulars and this warrants future research.
- Reservists were less likely to report problematic alcohol consumption compared to regular personnel and ex-regular veterans. The greatest amount of reservist problematic drinking was reported in non-deployed veteran reservists. This indicates problematic alcohol consumption is not deployment related in this group and highlights the need for ongoing formal support for alcohol use disorders in the UK Armed Forces.

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